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### The Oldest Romance in the West

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# The Oldest Romance in

How the yucca plant and the yucca moth depend on each other for reproo

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Photos courtesy Northwestern College, Iowa (left); M. J. Hatfield (right). [Original copyright photographs by Bob Rooney have been substituted for.]



# n the West

duction and survival.



By Paul A. Johnsgard

**F**OR A FEW SHORT WEEKS each June, the stately flowering spikes of Great Plains yuccas illuminate Nebraska's Sandhills and western plains. On each plant, spires of 20 to 60 ivory-white flowers emerge from a radiating array of needle-sharp leaves. The flowers rise above the rest of the vegetation like Roman candles freeze-framed in flight.

Entire hillsides are sometimes transformed by this sudden flower display – often along with sprinklings of blue spiderworts, golden yellow hoary puccoons and white daisy fleabanes.

After a few weeks the spectacular show is over, but for the yucca the story's best chapter has barely begun. To reproduce, it depends entirely on a single species of moth, which in turn depends on this lone species of yucca for its own reproduction. Last June in Keith County in western Nebraska, I observed what you might call the oldest romance in the West.

MOST NEBRASKANS CAN EASILY RECOGNIZE a yucca. It's part of a group of about 30 mostly western plants in the lily family having succulent, bayonet-like leaves and huge spikes of large whitish or ivory-colored flowers. The cup-shaped flowers open during the night and may remain conspicuous for several weeks.

Yuccas date back perhaps more than 50 million years, to a time when seed plants were first evolving. They have a relatively simple and primitive flower structure. These conspicuous white, fragrant, nocturnally-flowering blossoms provide strong clues to the identity of every yucca's pollinator: night-flying moths.

Yucca moths of the Great Plains are so tiny (well under an inch long) that they're hard to find. After many long hours of fruitlessly watching yuccas near sunset in hopes of seeing a yucca moth flying in, I finally discovered that by shaking a flowering stalk vigorously, I could often cause a moth or two to drop out.

In fact, yucca moths often spend the entire day hiding in the half-open blossoms, where their white color renders them almost impossible to see. However, similarly white-colored crab spiders also often hide in these blossoms, waiting patiently for insect prey. Yucca blossoms aren't the safest place for moths to spend the day!

THE MOTHS MATE WITHIN YUCCA BLOSSOMS as they open, but afterward the male plays no part in the process. The female moth visits and pollinates flowers between

dusk and midnight. She inserts her knife-like ovipositor into the side of the ovary and typically lays one egg in each of the ovary's three main subdivisions or chambers.

Before flying to another flower, she scoops up some of the stamens' sticky pollen with her specially-modified appendages. She forms the sticky pollen mass into a ball, which she carries to each of the flowers that she later visits. There she pushes some pollen into the central opening of the flower's stigma and inserts additional eggs, often re-pollinating the flower between egg-laying bouts.

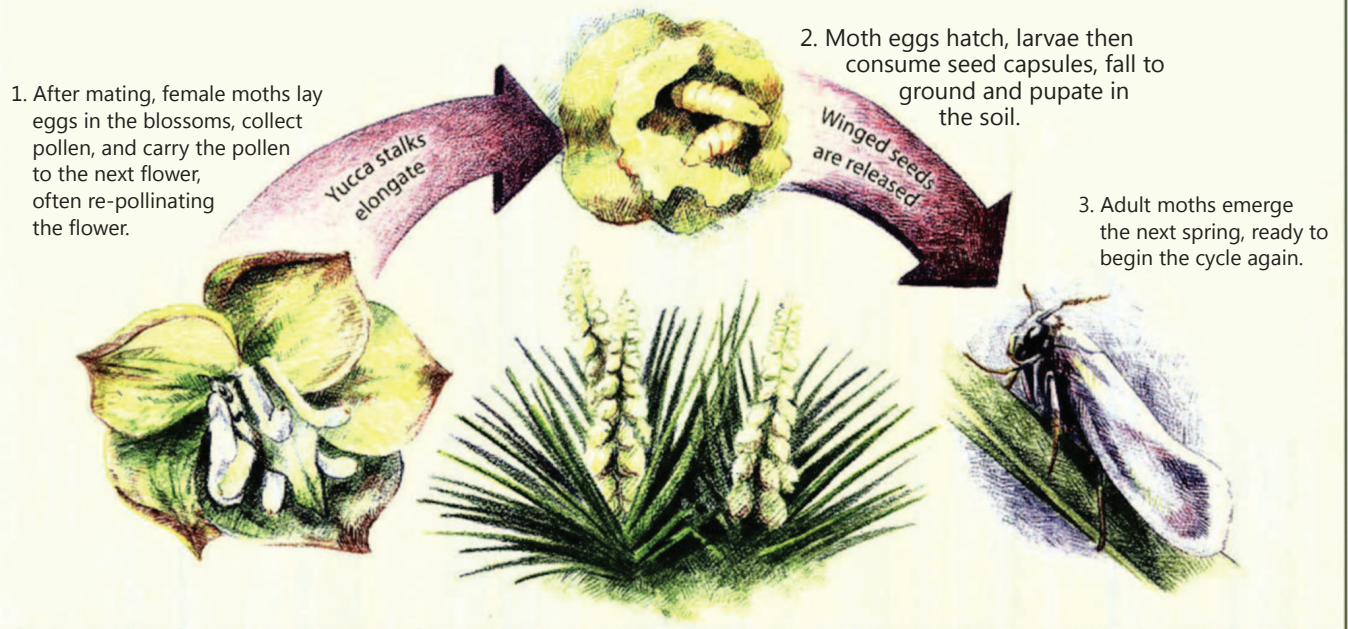
IT'S STILL QUESTIONABLE WHY EACH MOTH lays so few eggs per blossom. Typically, each fertilized yucca seedpod chamber holds only one to three moth larvae. Even after the larvae eat their fill, most of the seeds in the pod are left to mature.

It's been suggested that although each yucca produces several dozen flowers, many blossoms are dropped prematurely, including some that might have already been pollinated. That might force the moth to lay only a few eggs in each of many flowers, increasing its chances that at least some of the flowers it pollinates will persist and develop seeds. Not all marriages are made in heaven!

AFTER FERTILIZATION, the yucca's flowering stalks elongate and enlarge, while large and elongated three-chambered seedpods are formed, each of which is subdivided into two smaller units. During this period the

## The Great Dance of the Yucca Romance

Illustration by Anthony Kuhlmann





moth eggs hatch and the larvae begin to consume the developing seeds.

After it matures over the next month or two, each larva chews its way out of the seed capsule, falling to the ground and pupating in the soil. The adult moths emerge the following spring as ground temperatures warm and the yucca blooming season arrives.

In most cases many yucca seeds survive and mature. The mature seeds are rounded, flattened and tightly stacked atop one another, so that several hundred may be present in a single pod. The winged seeds are released

when the dried pod splits open, and may be carried by wind some distance from the adult plant. Few of these seeds are likely to germinate and survive in western Nebraska's arid environment, just as few moth larvae are likely to complete their own life cycle.

THIS HIGHLY UNLIKELY SCENARIO, in which two diverse species depend entirely on one another to achieve their own survival and reproduction, is sometimes called "obligatory mutualism" by ecologists. Less technically-oriented observers might simply call it amazing.

